LONDON-WEST MIDLANDS ENVIRONMENTAL STATEMENT

Volume 5 | Technical Appendices

CFA8 | The Chalfonts and Amersham

Survey reports (CH-004-008)

Cultural heritage

November 2013

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1.1 Structure of the cultural heritage appendices

1.1.1 The cultural heritage appendices for The Chalfonts and Amersham community forum area (CFA8) comprise:

- baseline reports (Volume 5: Appendix CH-001-008);
- a gazetteer of heritage assets (Volume 5: Appendix CH-002-008);
- an impact assessment table (Volume 5: Appendix CH-003-008); and
- survey reports (this appendix).

1.1.2 Maps referred to throughout the cultural heritage appendices are contained in the Volume 5, Cultural Heritage Map Book.

1.2 Surveys undertaken

1.2.1 This appendix contains the results of a series of archaeological surveys. These surveys comprised:

- a fully-integrated remote sensing survey incorporating light detection and ranging (LiDAR), hyperspectral imagery and aerial photographic analysis of the majority of the Proposed Scheme; and
- a geophysical survey at one location along the route (site code: CVoAD), encompassing 5.7ha.

Surveys proposed but not undertaken

1.2.2 Access was secured to all of the proposed survey sites within The Chalfonts and Amersham study area.

2 Remote sensing survey report

2.1 Introduction

2.1.1 This report outlines the results of the archaeological remote sensing survey of CFA8. This was an archaeological survey involving the systematic analysis, interpretation, mapping and recording of archaeological sites from aerial photographs, hyperspectral imagery and light detection and ranging (LiDAR).

2.1.2 The aim of the survey was to map and record the form and extent of archaeological features visible as cropmarks, soilmarks, earthworks or structures on a range of different remote-sensed imagery for the study area in order to inform the baseline assessment of the cultural heritage resource.

2.1.3 The study area has not been covered by an English Heritage national mapping programme project. The Thames Valley national mapping programme project area[1] falls to the south-west, and the area covered by the Hertfordshire national mapping programme project[2] lies to the north-east. There is no existing systematic survey of archaeological features visible on remote-sensed sources for the study area.

The study area

2.1.4 The study area for this remote sensing survey covered only those areas around the three proposed ventilation and intervention shafts (vent shafts) as it is proposed that the route will be tunnelled through the study area. The three vent shaft sites are all within Buckinghamshire.

2.1.5 At the proposed vent shaft sites the study area generally comprised a 700m-wide strip centred on the Proposed Scheme (350m either side of the Proposed Scheme centre line). This provided a buffer sufficient to offer contextual information for recorded sites. Where the Proposed Scheme boundary extended beyond the edge of the 700m-wide strip the study area was expanded to the limit of the remote sensing survey boundary shown in Figures CH-004.08.01 - CH-004.08.09.

2.1.6 In total, archaeological remote sensing survey for The Chalfonts and Amersham study area covered an area of 1.1km².

2.2 Methodology

2.2.1 In order to provide consistency with other similar datasets (namely English Heritage national mapping programme mapping) the archaeological remote sensing survey was carried out in broad accordance with the current version of the English Heritage national mapping programme standards[3]. The interpretations applied to identified features are consistent with the preferred terms within the English Heritage Monument Type Thesaurus.[4]

Sources: modern aerial photographs

2.2.2 High resolution (12.5cm) vertical aerial orthophotography taken specifically for the purposes of the project was made available for this survey. This imagery was captured during 2012. It generally consists of a 700m-wide strip centred on the route, although it is slightly wider in some areas. It was viewed digitally within a geographical information system (GIS) program. The level of accuracy of the orthorectification is such that features mapped from this source should be within 15cm of true ground position.

2.2.3 Pre-existing vertical aerial orthophotography dating from the 1990s and 2000s was also made available for this survey. This was supplied under the Pan-Government Agreement. The resolution is 25cm. The level of accuracy of the orthorectification is such that features mapped

[1] Fenner, V.E.P., (1994), *The Thames Valley Project: a report for the National Mapping Programme*, RCHME Aerial Survey Report Series.
[2] Fenner, V.E.P., (1992), *Crop Marks in Hertfordshire: a report for the National Mapping Programme*, RCHME internal document.
[3] Winton, H., (2012), *Standards for National Mapping Programme projects, Version 0.1* Draft, English Heritage, Aerial Investigation and Mapping, Typescript document.
[4] English Heritage; *NMR Monument Type Thesaurus*; http://thesaurus.englishheritage.org.uk/thesaurus.asp?thes_no=1; Accessed: August 2012–June 2013.

from this source should be within 1.5m of true ground position[5]. This vertical imagery was also viewed on-screen within GIS.

Sources: Historic aerial photographs

2.2.4 All readily-available historic vertical and oblique aerial photographs held in archives were also consulted for this project. This included photographs held at the English Heritage Archive (formerly the National Monuments Record) and the Cambridge University Unit for Landscape Modelling. The latter is also referred to as the Cambridge University Collection of Aerial Photography.

2.2.5 The 127 historic vertical aerial photographs of the study area in the English Heritage Archive (Table 5) were taken for non-archaeological purposes between 1942 and 1990 by organisations such as the Royal Air Force (RAF) and the Ordnance Survey (OS). These photographs often captured sites of historic interest incidentally especially those shots taken in the first half of the 20th century before archaeological remains may have been damaged or destroyed by the intensification of arable farming.

2.2.6 The 40 historic oblique aerial photographs of the study area in the English Heritage Archive (Table 6) were taken between 1927 and 2011 and usually targeted known sites of architectural or archaeological interest. They were typically taken at a much larger scale than the 'blanket' vertical aerial photography and were often timed to capture images of archaeological sites when they were at their most visible, i.e. when dry ground conditions favoured the development of clear cropmarks, or when low winter sun would reveal subtle earthworks.

2.2.7 Four Cambridge University Collection of Aerial Photography aerial photographs fell within the study area (Table 7). These were all vertical aerial photographs dating from 1985. As with the English Heritage vertical aerial photographs, the Cambridge University Collection of Aerial Photography photographs were taken for non-archaeological purposes, in this case as part of the Buckinghamshire county survey.

2.2.8 All aerial photographs in the English Heritage and Cambridge University Collection of Aerial Photography archives which fell within the study area were viewed in person and examined stereoscopically and under magnification where applicable. Copies were obtained where potential archaeological features were identified and the relevant photographs were considered to be of use either for transcription or for reference purposes.

Sources: LiDAR imagery

2.2.9 High resolution LiDAR data acquired specifically for the purposes of the project was made available for this survey. This data was captured in 2012. It generally consists of a 700m-wide strip centred on the Proposed Scheme although it is slightly wider in some areas.

2.2.10 The resolution of the data supplied was 20cm. The level of accuracy of the orthorectification was such that features mapped from this source should be within 15cm of true ground position. The raster digital elevation model was viewed directly within GIS. The digital elevation model is LiDAR data that has been processed to provide a representation of the ground surface without objects such as vegetation or buildings. This means that archaeological earthworks can be revealed on the LiDAR imagery even if they lie beneath areas of woodland.[6]

Sources: hyperspectral imagery

2.2.11 Hyperspectral imagery taken specifically for the purposes of the project was made available for this survey. This imagery was captured during a series of 'runs' in 2012 and provides a considerable buffer beyond the edge of the remote sensing survey study area boundary.

2.2.12 Hyperspectral imagery of the south-eastern end of the route had not been taken at the time of this survey. It was only available for the two northernmost proposed vent shaft locations[7].

2.2.13 Thirty-four separate spectral band widths were captured, ranging from 406.075 nanometres to 992.065 nanometres. The band widths varied slightly between 16.280 nanometres at the lower end of the spectrum to 18.280 nanometres [8]. For each of the areas surveyed varying combinations of three different bandwidths were analysed, with particular reference to bands 7–13 (882.725 nanometres to 773.255 nanometres) and bands 18–22 (683.435 nanometres to 612.185 nanometres), as these have been shown previously to be useful in archaeological remote sensing[9].

2.2.14 The hyperspectral imagery was viewed directly within GIS, as automated classification software does not work well with such high resolution data due to the prolifically varied response obtained from a single small area[10].

Sources: historic environment record (HER) data

2.2.15 Data from the Buckinghamshire HER was supplied for the survey. These records were used as a reference to aid interpretation of features visible on remote sensed imagery, either through a pre-existing identification of a visible feature, or by providing information that could help characterise the likely cultural heritage resource of the area.

2.2.16 The HER data was supplied as points, lines and polygons, with identifying attribute data attached. Full monument record reports were also supplied as a portable document format document. The data supplied covered the entirety of the Buckinghamshire area, creating an ample buffer to provide contextual information for any archaeological sites of interest within the boundary of the remote sensing study area.

Sources: national record of the historic environment

2.2.17 Monument data from the national record of the historic environment, held by English Heritage, was supplied for the survey. This data was used as a reference to aid interpretation of features visible on remote sensed imagery either through a pre-existing identification of a visible feature or by providing information that could help characterise the likely cultural heritage resource of the area.

[5] GeoStore; Aerial Photography RGB Product; http://www.geostore.com/geostore4/WebStore?xml=geostore4/xml/productsAPRGB.xml; Accessed: August 2013.

[6] This can sometimes depend upon the time of year that the LiDAR imagery was captured.
[7] The proposed vent shafts are covered by runs 4a and 5b.
[8] Blom, (2012), *HS2 Hyperspectral Information,* BLOM Project Number: 03/037/12.
[9] Powlesland, D., Lyall, J. and Donoghue, D., (1997), *Enhancing the record through remote sensing: the application and integration of multi-sensor, non-invasive remote sensing techniques for the enhancement of the Sites and Monuments Record.* Internet Archaeology 2; http://dx.doi.org/10.11141/ia.2.4; Accessed: 18 December 2012.
[10] Powlesland, D., Lyall, J. and Donoghue, D., (1997).

2.2.18 This data was supplied as points, lines and polygons with identifying attribute data attached. Full monument record reports were also supplied as a portable document format document. The data covered a 10km-wide strip (5km each side of the route centre line) thereby providing an ample buffer beyond the boundary of the remote sensing study area.

Sources: cartographic sources

2.2.19 Historic OS mapping was supplied for the survey. The map tiles had been geo-referenced and were viewed digitally in GIS. Epochs 1–4 of the 1:2500 scale County Series maps, which typically date from 1898 onwards, were used as a reference to aid interpretation of features visible on the remote sensed imagery.

2.2.20 In general, where features such as field boundaries, trackways, extractive pits or ponds were marked on historic OS maps, they were not mapped and recorded as part of this survey. This is because the objective of this project was to add to the known record not duplicate it. Nevertheless, where the full extent or form of a feature was not recorded in its entirety on the historic maps, it was included in the transcription for this project.

Interpretation, rectification and mapping

2.2.21 All vertical and oblique images from the sources identified above were systematically examined for any archaeological features visible as cropmarks, soilmarks, earthworks or structures. In accordance with best practice for remote sensing surveys all available sources for each field or land parcel were viewed in conjunction in order to enable the most accurate interpretation possible.

2.2.22 Where archaeological features were visible on the LiDAR or aerial orthophotography a detailed transcription, including all visible elements of the site in question, was carried out in ArcMap 10.1.

2.2.23 Where additional sites, features or details were visible on the historic oblique or vertical aerial photographs from the English Heritage Archive and Cambridge University Collection of Aerial Photography, these images were rectified using the computer program Aerial 5.33 prior to their import into ArcMap for transcription.

2.2.24 Digital OS MasterMap 1:1250 base maps were used to establish control points (it should be noted that even when 1:1250 scale data is obtained the scale of the mapping for rural areas is only in fact 1:2500[11]). Six or more control points were used for each photograph with errors kept below 1m for each control point. This provided accuracy to within 1m to the base map for the rectified photographs.

2.2.25 A Digital Terrain Model (DTM) in the form of 5m point data was used in order to further refine the accuracy of the rectifications.

2.2.26 The OS advise that their 1:1250 scale MasterMap data has an accuracy of 0.5m root mean square error for urban areas, and 1.1m root mean square error for rural areas[12]. Therefore, archaeological features transcribed from photographs rectified using this data will on average be accurate to within 1m–2m of their British national grid coordinates.

2.2.27 As noted above, in order to ensure consistency with other similar remote sensing datasets, this project was carried out in broad accordance with current national mapping programme standards and guidance: the identified features were transcribed onto the standard national mapping programme drawing layers, using standard national mapping programme conventions[13] as detailed in Table 1.

Table 1: Layers used in GIS for digital transcription of archaeological features[14]

Layer name	Colour	Description
Bank	Red	Defines the outline of positive features such as boundary banks or windmill mounds. Thin banks, or those too diffuse to define accurately are included on this layer as a single line.
Ditch	Green	Defines the outline of negative features such as boundary ditches or hollow ways. Thin ditches, or those too diffuse to define accurately are included on this layer as a single line.
Large cut feature	Blue	Defines the outline of sizeable negative features such as quarries or extractive pits.
Levelled ridge and furrow outline or direction	Magenta	Defines the outline of a single block of ridge and furrow seen either as a cropmark, or an earthwork later known to have been levelled. An arrow within each single block indicates the direction of ploughing.
Extant ridge and furrow outline or direction	Cyan	Defines the outline of a single block of ridge and furrow seen as earthworks on the latest available remote sensed imagery. An arrow within each single block indicates the direction of ploughing.
Extent of area	Grey	Defines the extent of large features such as the perimeters of World War II airfields and military camps.
T-hachure	Dark blue	Top of the 'T' defines the top of a slope or scarp edge such as a lynchet or house platform. Body of the 'T' indicates the length and direction of the slope.
Structure	Purple	Defines the extent of surviving buildings and structures such as individual World War II Nissen Huts and pillboxes. Thin structures such as walls or concrete paths are included in this layer as a single line.

2.2.28 Table 2 and Table 3 show period range and evidence range abbreviations used. The evidence abbreviations identify the form in which a feature is visible on the remote sensed imagery.

2.2.29 Information relating to each of the transcribed features was recorded in the ArcMap attribute table. This included details such as the interpretation of each feature and the remote sensed source they were transcribed from, as well as the HER and national record of the historic environment numbers for the features if applicable. These results have been set out in Table 4 of this survey report.

[11] Ordnance Survey; Products and Services FAQs: How accurate are your products?; http://www.ordnancesurvey.co.uk/oswebsite/support/products-services.html; Accessed: June 2013.
[12] Ordnance Survey; Products and Services FAQs: How accurate are your products?; http://www.ordnancesurvey.co.uk/oswebsite/support/products-services.html; Accessed: June 2013.

[13] Winton, H., (2012).
[14] Table 1 based on Winton, (2012), Section 7.5. P31.

Table 2: Period range abbreviations used in the GIS attribute data

Period	Abbreviation	Date range
Neolithic	N	4,000 – 2,200 BC
Bronze Age	BA	2,200 – 700 BC
Iron Age	IA	800 BC – AD 43
Roman	RO	AD 43 – 410
Early medieval	EM	AD 410 – 1066
Medieval	MD	AD 1066 – 1540
Post-medieval	PM	AD 1540 to 1901
20th century	C20	AD 1901 – 2000
World War II	WWII	1939 to 1945
Uncertain	UN	

Table 3: Evidence abbreviations used in the GIS attribute data

Evidence	Abbreviation
Cropmark (includes soilmarks)	C
Earthwork	E
Levelled earthwork	LE
Destroyed monument (i.e. quarried-away)	DM
Structure	S

2.2.30 The results of this remote sensing survey and transcription have been saved in the project ArcMap MXD and have been supplied with all of the additional required metadata attached. The results have also been exported as Esri shapefiles for ease of import into other GIS programs where necessary in compiling the baseline survey.

2.3 Limitations

2.3.1 Hyperspectral imagery of the south-eastern end of the Proposed Scheme had not been taken at the time of this survey. It was therefore only available for the two northernmost vent shaft locations within the study area.

2.3.2 In some areas, the 2012 LiDAR and aerial orthophotography did not cover the full extent of the Proposed Scheme.

2.3.3 Where archaeological sites have been identified solely from remote sensed imagery, without confirmation from archaeological excavation or supporting evidence in the form of find-spots, etc., it should be noted that the interpretation may be revised in the light of further investigation.

2.3.4 It should be stressed that the absence of an archaeological feature on remote sensed imagery does not confirm its absence in the ground, as visibility from the air is sometimes dependent upon a complex combination of factors. These include:

- unsuitable conditions at the time of image capture (such as lighting, ground moisture content and crops or other ground cover);
- variable quality of photography;
- underlying features being masked by alluvial build-up; and
- areas where archaeological features either do not survive or have never existed.

2.3.5 During the survey 'steps' of approximately 2m were noted at several points in the purpose-flown 2012 vertical orthophotography where adjacent image tiles had been joined to provide continuous coverage of the Proposed Scheme. This issue was escalated as appropriate.

2.3.6 Archaeological features were not mapped beyond the boundary of the remote sensing survey study area, as the cumulative effect of this along the entire length of the Proposed Scheme would have resulted in a significant increase in the study area. Where archaeological cropmarks, earthworks, soilmarks or structures continued beyond the study area boundary, this was noted in the attribute data of the mapped feature.

2.3.7 The hyperspectral imagery obtained for the purposes of the project did not include spectral bands in the short-wave to mid-infrared/thermal wavelengths (2,080 nanometres –13,000 nanometres), which have been shown in the past to be of particular use in assessing archaeological potential. The mid-infrared/thermal range is especially likely to reveal subtle cropmarks or soilmarks that are not strong enough to be detectable in the visible part of the spectrum due to the fact it will display very slight differences in water content present within both vegetation and the ground[15].

2.4 Assumptions

2.4.1 Information on the positional accuracy of the hyperspectral imagery has not been supplied. As such it is assumed that the accuracy of the orthorectification of this source is at least as good as that of the Aerial 5.33 program outlined in Section 2.2.21 of this report – i.e. transcribed features will be accurate to within 1m–2m of true ground position. Reference should be made to the note in Section 2.3.5 of this report, however, regarding the 2m 'step' observed in some locations.

2.5 Results: description

2.5.1 The primary output of the archaeological remote sensing survey of the study area was the detailed digital transcription of each identified potential archaeological feature. Information pertaining to the interpretation of these features is contained within the attribute data of every line and polygon drawn in GIS.

2.5.2 Table 4**Error! Reference source not found.** itemises in detail the results of the survey. These details originate from the GIS attribute data. The results should be read in conjunction with Figures CH-004-08.01–09 of this report.

[15] Powlesland, D., Lyall, J. and Donoghue, D., (1997).

2.5.3 Where a single mapped feature has generated two lines of identical attribute data[16], the duplicate line has been removed from Table 4. Where the transcription of a site or feature consists of several lines or polygons which may have been visible on different sources, or in a different form (i.e. where different elements of the site are visible as both cropmarks and earthworks), the differing lines of the attribute data table have been retained in order to reflect these variations.

2.5.4 The aerial survey ID is the unique identifier applied to each site or feature transcribed during this project. It was not considered sufficient to use the automatically generated 'feature ID' within GIS, as this would result in a site which consisted of several different features represented by different lines and polygons having several different identifying numbers. The aerial survey ID was also used to group features such as several interconnecting former field boundaries. For example, feature H07 consists of five separate sections of bank visible as faint earthworks. This is consistent with the approach taken by English Heritage on national mapping programme projects[17]. The aerial survey ID is prefixed with a different sequential letter for each CFA; for The Chalfonts and Amersham study area it is the letter 'H'.

2.5.5 The national record of the historic environment and HER columns detail the relevant monument numbers for these authorities where such numbers exist for transcribed features. None of the transcribed features had a pre-existing monument record in either of these databases.

2.5.6 The period abbreviations used are set out in Table 2.

2.5.7 As noted in Section 2.2.1 of this report the interpretation types (detailed in the Type column) comply with the preferred terms within the English Heritage monument type thesaurus[18] in order to achieve consistency with other similar transcribed datasets.

2.5.8 The evidence abbreviations refer to the physical nature of the recorded features. These abbreviations are set out in Table 3.

2.5.9 The remote sensed imagery used to transcribe each individual feature is detailed in the source column.

2.5.10 The description column is intended as a brief interpretation only, outlining the main features or points of note.

2.5.11 The full attribute table attached to every line and polygon transcribed as part of this survey contains additional columns not displayed in Table 4 such as the date the feature was transcribed and the initials of the member of staff responsible, etc.

2.5.12 Although the main source for mapping the features visible within the study area was LiDAR, it should be noted that the full range of modern and historic remote sensed sources detailed in Section 2.2.2 of this report was consulted. The mapped features were visible on many of these sources but were transcribed from the already orthorectified LiDAR tiles rather than unnecessarily applying a rectification to an archive aerial photograph.

[16] Such as a block of ridge-and-furrow, which contains this information within both the polygon that defines its extent and the line indicating the direction of ploughing.
[17] Winton, H., (2012).
[18] English Heritage, *NMR Monument Type Thesaurus.*

Table 4: Exported GIS attribute data for each transcribed feature, detailing the interpretation applied.

Aerial survey ID	National record of the historic environment	HER reference	Period	Type	Evidence	Source	Description
H01	N/A	N/A	MD / PM	Ridge and furrow	E	HS2 LiDAR 2012	Ridge and furrow is very faintly visible on LiDAR as barely-surviving earthworks within the playing field on the northern side of Chalfont St Peter.
H02	N/A	N/A	MD / PM	Ridge and furrow	E / LE	NMR TQ0092-1 NMR 18941-1 22-SEPT-2000 / HS2 LiDAR 2012	A small field of ridge and furrow is visible on an oblique aerial photograph of 2000 as extant earthworks. By the time of the 2012 LiDAR it appears to have been levelled.
H03	N/A	N/A	MD / PM	Ridge and furrow	E	HS2 LiDAR 2012	A fragment of ridge and furrow is visible as extant earthworks on the south-east side of a field. Possibly faintly visible across the rest of the field too, but not showing strongly enough to map.
H04	N/A	N/A	MD / PM	Ridge and furrow	E	HS2 LiDAR 2012	A small fragment of ridge and furrow is visible on LiDAR as faintly extant earthworks in the eastern corner of a narrow field.
H05	N/A	N/A	MD / PM	Ridge and furrow	E	HS2 LiDAR 2012	Ridge-and-furrow is only just visible as very faintly extant earthworks across the paddocks of Turners Wood Farm. Frequently interrupted by fencelines and pathways.
H06	N/A	N/A	PM / UN	Extractive pit Quarry Natural feature	E	HS2 LiDAR 2012	Possible former quarry visible on LiDAR as a large 'U-shaped' pit. Not on modern or historic OS maps. Due to the proliferation of probable dolines on the chalk bedrock in the vicinity, this may alternatively be a composite solution hollow or doline.
H07	N/A N/A	N/A N/A	MD / PM	Field boundary Boundary bank	E	HS2 LiDAR 2012	A probable former field boundary bank is just visible on LiDAR as a very faint linear earthwork. Not recorded on historic OS maps.
						HS2 LiDAR 2012	A group of probable former field boundary banks is just visible on LiDAR as very faint linear earthworks. Not recorded on historic OS maps.
H08	N/A	N/A	PM / UN	Extractive pit Quarry	E	HS2 LiDAR 2012	A former quarry is visible on LiDAR beneath trees as a group of large adjacent pits and spoil heaps. Not on historic or modern OS maps. The pits continue to the north-west, but mapping is truncated at the project boundary.
H09	N/A	N/A	PM / UN	Extractive pit Quarry	E	HS2 LiDAR 2012	A probable quarry is visible on LiDAR beneath the trees of a small area of woodland as a large sub-oval pit. Not recorded on either the modern or historic OS maps.
H10	N/A	N/A	PM / UN	Extractive pit Quarry	E	HS2 LiDAR 2012	A possible former quarry pit is visible on LiDAR beneath trees as a circular hollow. Not on historic or modern OS maps. Only partially mapped. Continues to south-west but mapping is truncated at the project boundary.
H11	N/A	N/A	MD / PM	Field boundary Boundary bank	E	HS2 LiDAR 2012	A possible former field boundary bank is visible on LiDAR as a linear earthwork in the field to the west of the hospital. Not recorded on historic OS maps. Continues to north-west, but not mapped beyond project boundary.
H12	N/A	N/A	MD / PM	Field boundary Boundary bank	E	HS2 LiDAR 2012	A possible former field boundary bank is visible on LiDAR as a faintly extant rectilinear bank. Its considerable width will be attributable to centuries of plough-spreading. Continues to north-west, but not mapped beyond the project boundary.
					C	Cambridge University Collection of Aerial Photography RC8HG081 06-MAR-1985	A possible former field boundary bank is visible as a cropmark of a linear bank. Its considerable width is likely attributable to centuries of plough-spreading. Bank to the north is still faintly extant on LiDAR so was mapped separately.

2.6 Results: interpretation

2.6.1 Twelve possible archaeological features were recorded from the remote sensed imagery that was surveyed as part of this project.

2.6.2 The survey recorded evidence for medieval ridge-and-furrow cultivation in the form of surviving earthworks.

2.6.3 The survey also recorded a number of banks (features H07, H11 and H12) which might represent former field boundaries. These putative field boundaries are not visible on the 19th and 20th century cartographic sources suggesting that they are medieval or earlier post-medieval in date.

2.6.4 The high resolution of the LiDAR imagery revealed the prolific occurrence of dolines, or solution holes/hollows, across the landscape. Dolines are common on chalk bedrocks[19], such as that of the survey area[20]. Dolines can appear similar to the remains of former quarrying activity, but in this instance, the overwhelming frequency of their occurrence indicated that these features were likely to be of natural origin. The place-name 'Hobbs Hole' is marked in the area of the proposed central vent shaft on the modern and historic OS maps, and this might be an allusion to the dolines.

2.6.5 The survey also recorded what appeared to be genuine evidence of past extractive industry (features H06, 8-10). These extractive features were jagged and irregularly shaped and sometimes had accompanying spoil heaps, differentiating them from the smooth circular or oval dolines. It is not unknown for dolines to be worked as chalk pits[21] and it is possible that this may have been the origin of some of the former quarries mapped here.

2.6.6 Feature H06 has been interpreted as a possible large post-medieval or later quarry. It is not depicted on OS mapping, however, which is unusual for a quarry pit of such considerable size. Dolines can sometimes occur in closely grouped clusters as is evidenced by the LiDAR of the surrounding landscape. Over time clustered dolines may be enlarged through natural processes eventually combining to make one large, irregular, composite doline[22]. It is possible that this is the origin of feature H06, although the question of whether or not it was subsequently worked and expanded as a chalk pit would require further investigation.

2.7 Conclusions

2.7.1 Twelve individual or grouped possible archaeological features were identified by the survey, none of which had previously been recorded by either the HER or the NHL.

2.7.2 The identified features comprise the remains of medieval/post-medieval ridge-and-furrow and field boundaries, and post-medieval quarrying.

2.8 References

Blom (2012) *HS2 Hyperspectral Information*, BLOM Project Number: 03/037/12.

British Geological Survey, (2012), *Digital Geological Map of Great Britain (DiGMapGB-10) at 1:10 000 scale, for bedrock geology and superficial deposits*, Digital Data Licence No. 2012/062.

English Heritage; NMR Monument Type Thesaurus; http://thesaurus.english-heritage.org.uk/thesaurus.asp?thes_no=1; Accessed: August 2012 - June 2013.

Fenner, V.E.P., (1992), *Crop Marks in Hertfordshire: a report for the National Mapping Programme*, RCHME internal document.

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Winton, H., (2012), *Standards for National Mapping Programme projects*, Version 0.1 Draft, English Heritage, Aerial Investigation and Mapping, Typescript document.

[19] Wilson, D., (2000), *Air Photo Interpretation for Archaeologists,* Tempus Publishing Ltd, Stroud. P168-9; Natural Environment Research Council (NERC) (2006) Geology of the Salisbury Sheet Area, British Geological Society, Onshore Geology Series, Internal Report IR/06/011 P212.
[20] British Geological Survey, (2012), *Digital Geological Map of Great Britain (DiGMapGB-10) at 1:10 000 scale, for bedrock geology and superficial deposits*, Digital Data Licence No. 2012/062.
[21] NERC, (2006) P.215.
[22] NERC , (2006) P.212.

2.9 Historic aerial photographs consulted

Table 5: English Heritage vertical aerial photographs consulted for the remote sensing survey of The Chalfonts and Amersham study area

English Heritage library number	Original sortie number	Original frame number	Date taken
668	RAF/CPE/UK/2136	3145	02 June 1947
668	RAF/CPE/UK/2136	3146	02 June 1947
1115	RAF/541/571	3062	10 June 1950
1115	RAF/541/571	3089	10 June 1950
1115	RAF/541/571	3090	10 June 1950
1115	RAF/541/571	4067	10 June 1950
1115	RAF/541/571	4068	10 June 1950
1115	RAF/541/571	4092	10 June 1950
1115	RAF/541/571	4093	10 June 1950
1168	RAF/58/692	3088	24 May 1951
1168	RAF/58/692	3089	24 May 1951
1168	RAF/58/692	3090	24 May 1951
1168	RAF/58/692	4027	24 May 1951

1176	RAF/540/494	3101	12 May 1951
1176	RAF/540/494	3102	12 May 1951
1257	RAF/540/738	4232	17 May 1952
1518	RAF/540/1285	126	13 April 1954
1518	RAF/540/1285	127	13 April 1954
1518	RAF/540/1285	128	13 April 1954
1518	RAF/540/1285	177	13 April 1954
1518	RAF/540/1285	178	13 April 1954
1518	RAF/540/1285	179	13 April 1954
1548	RAF/58/1472	226	24 June 1954
1548	RAF/58/1472	227	24 June 1954
1548	RAF/58/1472	267	24 June 1954
1548	RAF/58/1472	310	24 June 1954
1548	RAF/58/1472	335	24 June 1954
1652	RAF/82/1190	159	11 May 1955
1652	RAF/82/1190	160	11 May 1955
2352	RAF/58/1687	327	17 March 1955
2352	RAF/58/1687	328	17 March 1955
2354	RAF/58/1671	245	03 March 1955
2354	RAF/58/1671	260	03 March 1955
2354	RAF/58/1671	261	03 March 1955
2354	RAF/58/1671	262	03 March 1955
3555	RAF/106G/UK/686	3130	23 August 1945
3555	RAF/106G/UK/686	3178	23 August 1945
3555	RAF/106G/UK/686	3258	23 August 1945
8632	RAF/HLA/647	1061	22 December 1942
8632	RAF/HLA/647	1062	22 December 1942
8632	RAF/HLA/647	2064	22 December 1942
8632	RAF/HLA/647	2065	22 December 1942
10452	OS/73056	343	31 March 1973
10452	OS/73056	344	31 March 1973
10452	OS/73056	345	31 March 1973
10452	OS/73056	436	31 March 1973
11641	OS/69313	255	30 June 1969
11641	OS/69313	256	30 June 1969
11641	OS/69313	267	30 June 1969
11641	OS/69313	268	30 June 1969
11641	OS/69313	339	30 June 1969
11641	OS/69313	340	30 June 1969
11641	OS/69313	341	30 June 1969
11643	OS/57T9	3	05 April 1957
11643	OS/57T9	4	05 April 1957
11644	OS/59020	2	30 April 1959
11644	OS/59020	34	30 April 1959
11644	OS/59020	35	30 April 1959
11644	OS/59020	63	30 April 1959
11646	OS/59073	33	16 June 1959
11646	OS/59073	34	16 June 1959
11646	OS/59073	35	16 June 1959
11648	OS/59015	36	24 April 1959
11648	OS/59015	37	24 April 1959
11648	OS/59015	68	24 April 1959
11648	OS/59015	69	24 April 1959
11648	OS/59015	70	24 April 1959
11648	OS/59015	71	24 April 1959
11648	OS/59015	77	24 April 1959
11648	OS/59015	79	24 April 1959
11648	OS/59015	80	24 April 1959
11648	OS/59015	81	24 April 1959
11648	OS/59015	82	24 April 1959
11648	OS/59015	135	24 April 1959
11648	OS/59015	136	24 April 1959
11648	OS/59015	147	24 April 1959
11648	OS/59015	148	24 April 1959
11648	OS/59015	149	24 April 1959
11648	OS/59015	150	24 April 1959

11648	OS/59015	151	24 April 1959
11648	OS/59015	152	24 April 1959
11648	OS/59015	153	24 April 1959
11648	OS/59015	184	24 April 1959
11648	OS/59015	185	24 April 1959
11648	OS/59015	186	24 April 1959
11648	OS/59015	187	24 April 1959
11648	OS/59015	188	24 April 1959
11648	OS/59015	189	24 April 1959
11649	OS/59019	7	30 April 1959
11649	OS/59019	36	30 April 1959
11649	OS/59019	37	30 April 1959
11649	OS/59019	38	30 April 1959
11649	OS/59019	38	30 April 1959
11649	OS/59019	39	30 April 1959
11649	OS/59019	40	30 April 1959
11649	OS/59019	41	30 April 1959
11649	OS/59019	101	30 April 1959
11649	OS/59019	135	30 April 1959
11649	OS/59019	136	30 April 1959
11649	OS/59019	168	30 April 1959
11649	OS/59019	169	30 April 1959
11649	OS/59019	170	30 April 1959
11650	OS/59101	23	12 September 1959
11651	OS/59017	31	29 April 1959
11651	OS/59017	32	29 April 1959
11651	OS/59017	33	29 April 1959
11652	OS/59018	8	30 April 1959
11652	OS/59018	9	30 April 1959
11652	OS/59018	10	30 April 1959
11694	OS/57T8	32	05 April 1957
13650	OS/90024	93	18 March 1990
13650	OS/90024	94	18 March 1990
13650	OS/90024	121	18 March 1990
13650	OS/90024	122	18 March 1990
13650	OS/90024	123	18 March 1990
13650	OS/90024	138	18 March 1990
13650	OS/90024	139	18 March 1990
13650	OS/90024	140	18 March 1990
13650	OS/90024	145	18 March 1990
13650	OS/90024	146	18 March 1990
13650	OS/90024	147	18 March 1990
13650	OS/90024	148	18 March 1990
13650	OS/90024	175	18 March 1990
13651	OS/90025	322	18 March 1990
13651	OS/90025	347	18 March 1990
13651	OS/90025	356	18 March 1990
13651	OS/90025	357	18 March 1990

Table 6: English Heritage oblique aerial photographs consulted for the remote sensing survey of The Chalfonts and Amersham study area

English Heritage photo reference	**Film number**	**Original frame number**	**Date taken**
SU 9596 / 01	NMR 23635	/ 07	19 July2004
SU 9596 / 02	NMR 23635	/ 08	19 July2004
SU 9596 / 03	NMR 23635	/ 09	19 July2004
SU 9596 / 04	NMR 23635	/ 10	19 July2004
SU 9596 / 05	NMR 23582	/ 11	19 July2004
SU 9596 / 06	NMR 23582	/ 12	19 July2004
SU 9596 / 07	AFL 60479	/ EPW021363	27 May 1928
SU 9597 / 01	AFL 60381	/ EPW017830	April 1927
SU 9597 / 02	AFL 60381	/ EPW017831	April1927
SU 9597 / 03	AFL 60381	/ EPW017834	April 1927
SU 9597 / 04	AFL 60381	/ EPW017835	April 1927
SU 9597 / 05	AFL 60479	/ EPW021359	27 May 1928
SU 9597 / 06	AFL 60479	/ EPW021360	27 May 1928
SU 9597 / 07	AFL 60479	/ EPW021361	27 May 1928
SU 9597 / 08	AFL 60479	/ EPW021362	27 May 1928

SU 9597 / 09	NMR 26962	/ 44	01 June 2011
SU 9597 / 10	NMR 26962	/ 45	01 June 2011
SU 9597 / 13	NMR 26962	/ 48	01 June 2011
SU 9597 / 14	NMR 26962	/ 47	01 June 2011
SU 9597 / 15	NMR 26962	/ 46	01 June 2011
TQ 0092 / 01	NMR 18941	/ 01	22 September 2000
TQ 0092 / 02	NMR 18941	/ 02	22 September 2000
TQ 0092 / 03	NMR 18941	/ 03	22 September 2000
TQ 0092 / 04	NMR 18941	/ 04	22 September 2000
TQ 0092 / 05	NMR 18941	/ 05	22 September 2000
TQ 0092 / 06	NMR 18941	/ 06	22 September 2000
TQ 0092 / 08	NMR 18941	/ 08	22 September 2000
TQ 0092 / 09	NMR 18941	/ 09	22 September 2000
TQ 0092 / 10	NMR 18941	/ 10	22 September 2000
TQ 0092 / 11	NMR 18941	/ 11	22 September 2000
TQ 0092 / 12	NMR 18941	/ 12	22 September 2000
TQ 0092 / 13	NMR 18941	/ 13	22 September 2000
TQ 0092 / 14	NMR 18935	/ 01	22 September 2000
TQ 0092 / 15	NMR 18935	/ 02	22 September 2000
TQ 0092 / 16	NMR 18935	/ 03	22 September 2000
TQ 0092 / 17	NMR 18935	/ 04	22 September 2000
TQ 0092 / 18	NMR 18935	/ 05	22 September 2000
TQ 0092 / 19	NMR 18834	/ 21	22 September 2000
TQ 0092 / 20	NMR 18834	/ 22	22 September 2000
TQ 0092 / 22	NMR 18834	/ 24	22 September 2000

Table 7: Cambridge University Collection of Aerial Photography aerial photographs consulted for the remote sensing survey of The Chalfonts and Amersham study area

Cambridge University Collection of Aerial Photography catalogue number	**Type**	**Date taken**
RC8HF196	06/03/1985	Vertical
RC8HG023	06/03/1985	Vertical
RC8HG024	06/03/1985	Vertical
RC8HG081	06/03/1985	Vertical

2.10 Figures

CH-004-08.01	Remote sensing survey interpretation	1:5,000
CH-004-08.02	Remote sensing survey interpretation	1:5,000
CH-004-08.03	Remote sensing survey interpretation	1:5,000
CH-004-08.04	Remote sensing survey interpretation	1:5,000
CH-004-08.05	Remote sensing survey interpretation	1:5,000
CH-004-08.06	Remote sensing survey interpretation	1:5,000
CH-004-08.07	Remote sensing survey interpretation	1:5,000
CH-004-08.08	Remote sensing survey interpretation	1:5,000
CH-004-08.09	Remote sensing survey interpretation	1:5,000

3 Geophysical surveys

3.1 Site CVoAD: Ashwell's Farm (CHA017)

Introduction

3.1.1 In June 2013 an archaeological geophysical survey was undertaken at a site located to the south of Ashwell's Farm (CHA017), Chesham Lane, Chalfont St. Peter, Buckinghamshire (site code CVoAD; Figure CH-004-08.10). The aim of the survey was to locate and characterise any anomalies of possible archaeological interest within the site.

The site

3.1.2 The survey area is located at national grid reference SU 99987 93295 and comprises an 'L'-shaped block of land, approximately 5.7ha in extent, extending across three small hayfields (Figure CH-004-08.11). It stands on the western edge of a plateau at an elevation of between 100m and 105m AOD (above Ordnance Datum). To its south-west there is a moderately steep slope which leads down to the valley of the River Misbourne.

3.1.3 The geology of the survey area comprises chalk overlain by Beaconsfield terrace gravels[23] of Middle Pleistocene date[24]. The Chalk is "prone to the development of karstic features" hence there are "large numbers of swallow holes, solution pipes and subsidence sinkholes in the area around Chalfont St Peter"[25].

Summary archaeological/historic background

3.1.4 The survey site lies to the immediate south-west of Ashwell's Farm (CHA017). Although the present farm buildings date to the 17th century the farmstead had a medieval precursor. It is also possible that Ashwell's Farm represents a former medieval manorial site or the location of a deserted medieval village.

Methodology

3.1.5 The survey was in line with a written scheme of investigation[26]. An independent network of 30m grid squares was established within each of the three fields to be surveyed. Each grid was laid out with a tape measure and optical square and was tied in to the Ordnance Survey national grid by recording the baseline location with a Leica Systems 1200 differential global positioning system (Figure CH-004-08.12).

3.1.6 The survey data was collected with Bartington Grad 601-2, twin sensor array, vertical component fluxgate gradiometers. These are standard instruments for archaeological survey, capable of resolving magnetic field strength to a precision of 0.1 nanoTesla[27]. The instruments were carried at a brisk but steady pace through each grid square, collecting data along 1m-spaced traverse lines. Measurements were automatically triggered every 0.25m along the traverses, giving a total of 3,600 measurements per grid square.

3.1.7 The survey data was viewed and processed using Geoplot 3.00v software. Striping, caused by slight mismatches in sensor balance, was removed using the 'zero mean traverse' function and destaggering of the data was performed as necessary. Greyscale bitmaps of the data (scale +/- 4 nanoTesla, black/white) were exported and were georectified using the RasTools function in MapInfo. XY trace plots of the data were not produced, as they were not considered to be appropriate in this instance.

Limitations

3.1.8 Magnetometer survey is a useful and widely-deployed form of archaeological prospection, but suffers from several well-recognised limitations[28]:

- it is a shallow-seeking technique and is generally unable to detect archaeology beneath more than 1m of overburden;
- small and ephemeral remains (e.g. postholes, beam slots, cremation burials) are rarely detected especially at the standard survey resolution of 1m x 0.25m;
- stone building remains can only be detected under particularly favourable conditions;
- the technique can be ineffective over certain geological substrates which do not support the formation of well-developed contrasts in soil magnetism. It may also be hindered by highly magnetic geologies (e.g. ironstone, igneous dykes); and
- certain modern structures (e.g. fences, steel-framed buildings, water pipes) produce intense magnetic halos which can obscure the much weaker anomalies arising from archaeological remains.

Assumptions

3.1.9 There are no methodological assumptions applicable to the conduct of this survey. It should be noted, however, that the interpretation of archaeological geophysical data is a qualitative process, based on a combination of theoretical principles and past experience and that absolute confidence is not always achievable.

Results: description

3.1.10 Reference should be made to Figures CH-004-08.13 and CH-004-08.14.

3.1.11 The data from Fields 1 and 2 is dominated by a dense scatter of amorphous positive anomalies, with typical intensities in the range of 1 nanoTesla to 10 nanoTesla. Several of these define a broad north-east/south-west linear trend. Small dipolar anomalies are also present in both fields, and a much larger dipolar anomaly (maximum intensity 941 nanoTesla)

[23] British Geological Survey; GeoIndex; http://mapapps2.bgs.ac.uk/geoindex/home.html; Accessed: 22 July 2013.
[24] Bridgland, D.R. (1994), *Quaternary of the Thames, Geological Conservation Review Series No. 7*, Chapman and Hall, London, Pg. 6.
[25] Edmonds, C. (2005), *Subsidence over a chalk pipe at Chalfont St Peter, U.K.*, in Waltham, T., Bell, F. and Culshaw M. (ed.) *Sinkholes and subsidence: Karst and cavernous rocks in engineering and construction*, Springer-Praxis, Chichester, Pg. 309.
[26] Cotswold Archaeology (2013), *HS2 Buckinghamshire: Written Scheme of Investigation for Geophysical and Metal Detecting Surveys.*
[27] Bartington, G. and Chapman, C. (2003), *'A high-stability fluxgate magnetic gradiometer for shallow geophysical survey applications*, Archaeological Prospection Vol. 11, Pgs. 19–34.
[28] English Heritage, (2008), *Geophysical survey in archaeological field evaluation*, English Heritage, Swindon. Pgs. 13–18.

lies towards the centre of Field 1. In Field 2, there are also three weakly negative linear anomalies, aligned parallel with the south-western field boundary.

3.1.12 The results from Field 3 are comparable to those from Fields 1 and 2, although the amorphous positive anomalies are smaller and less ubiquitous. One large dipolar magnetic anomaly occurs at the eastern edge of the field, and there are a number of small gaps in the data, where the survey of this field was obstructed by hay bales.

Results: interpretation

3.1.13 The amorphous positive anomalies are best interpreted as background 'noise' of little or no archaeological significance. They could arise from a range of geological causes including localised zones of iron mineralisation, gross variations in the composition of the natural gravel and perhaps pockets of deep sediment within solution features. It is also possible, technically speaking, that some of the anomalies could represent man-made pits. Their near ubiquity across the survey, however, means that geological interpretations must be strongly favoured over an archaeological one.

3.1.14 Weakly negative linear anomalies, such as those found in Field 2, can have a variety of modern causes. In this case their alignment parallel to one of the field boundaries suggests that they probably represent scars from an episode of deep ploughing. There are occasions, however, where similar anomalies have been found to represent service runs– for instance water pipes feeding cattle troughs.

3.1.15 The dipolar anomalies in Fields 1 and 2 are diagnostic of ferrous items. The smaller examples will probably represent pieces of scrap metal within the topsoil, whilst the larger example in Field 1 probably represents a more substantial buried object. The large magnetic halo at the eastern edge of Field 3 can be attributed to a trailer which was parked alongside the survey area.

Conclusions

3.1.16 The survey has detected no obvious archaeological remains. The data is dominated by a mass of amorphous positive anomalies and these are almost certainly geological in origin although the possibility that some represent pits cannot be excluded entirely. One large ferrous object, of unknown character and date, has also been detected.

3.2 References

Bartington, G. and Chapman, C., (2003), *A high-stability fluxgate magnetic gradiometer for shallow geophysical survey applications*, Archaeological Prospection Vol. 11, Pgs. 19-34.

Bridgland, D.R., (1994), *Quaternary of the Thames, Geological Conservation Review Series No. 7*, Chapman and Hall, London.

British Geological Survey; GeoIndex; http://mapapps2.bgs.ac.uk/geoindex/home.html; Accessed: July 2013.

British Geological Survey 2013; Geology of Britain Viewer; http://mapapps.bgs.ac.uk/geologyofbritain/home.html; Accessed: 31 July 2013.

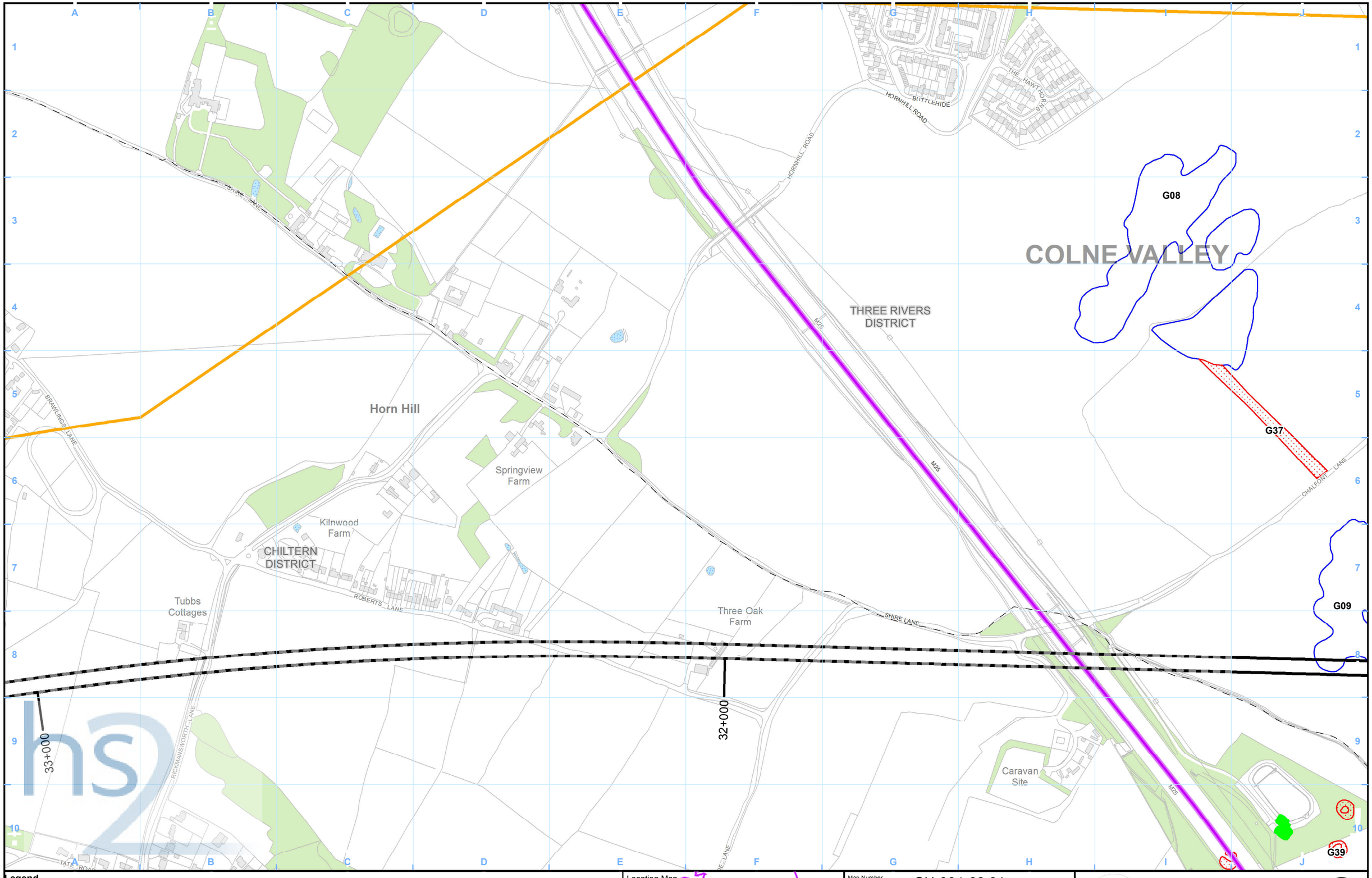
Cotswold Archaeology, (2013), *HS2 Buckinghamshire: Written Scheme of Investigation for Geophysical and Metal Detecting Surveys*.

Edmonds, C., (2005), *Subsidence over a chalk pipe at Chalfont St Peter, U.K.*, in Waltham, T., Bell, F. and Culshaw M. (ed.), *Sinkholes and subsidence: Karst and cavernous rocks in engineering and construction*, Springer-Praxis, Chichester.

English Heritage, (2008), *Geophysical Survey in Archaeological Field Evaluation*, English Heritage, Portsmouth.

3.3 Figures

CH-004-08.10	CVoAD: Site location diagram	1:50,000
CH-004-08.11	CVoAD: Location of survey area	1:2,500
CH-004-08.12	CVoAD: Tie-in information	1:2,500
CH-004-08.13	CVoAD: Magnetometer data plot	1:2,500
CH-004-08.14	CVoAD: Interpretation plot	1:2,500



Legend

- Route in tunnel
- Route on surface
- Community forum boundary
- District/Borough boundary
- Watercourse
- Water body
- Woodland
- Remote sensing survey boundary

Archaeological features
- Bank
- Ditch
- Extant ridge and furrow direction
- Levelled ridge and furrow direction
- Structure
- T-Hachure

- Extent of Area
- Bank
- Ditch
- Extant ridge and furrow outline
- Levelled ridge and furrow outline
- Structure
- Large cut feature

Location Map

Map Number: CH-004-08.01

Map Name: Remote Sensing Survey Interpretation

Community Forum Area CFA8: The Chalfonts & Amersham

Scale at A3: 1:5,000

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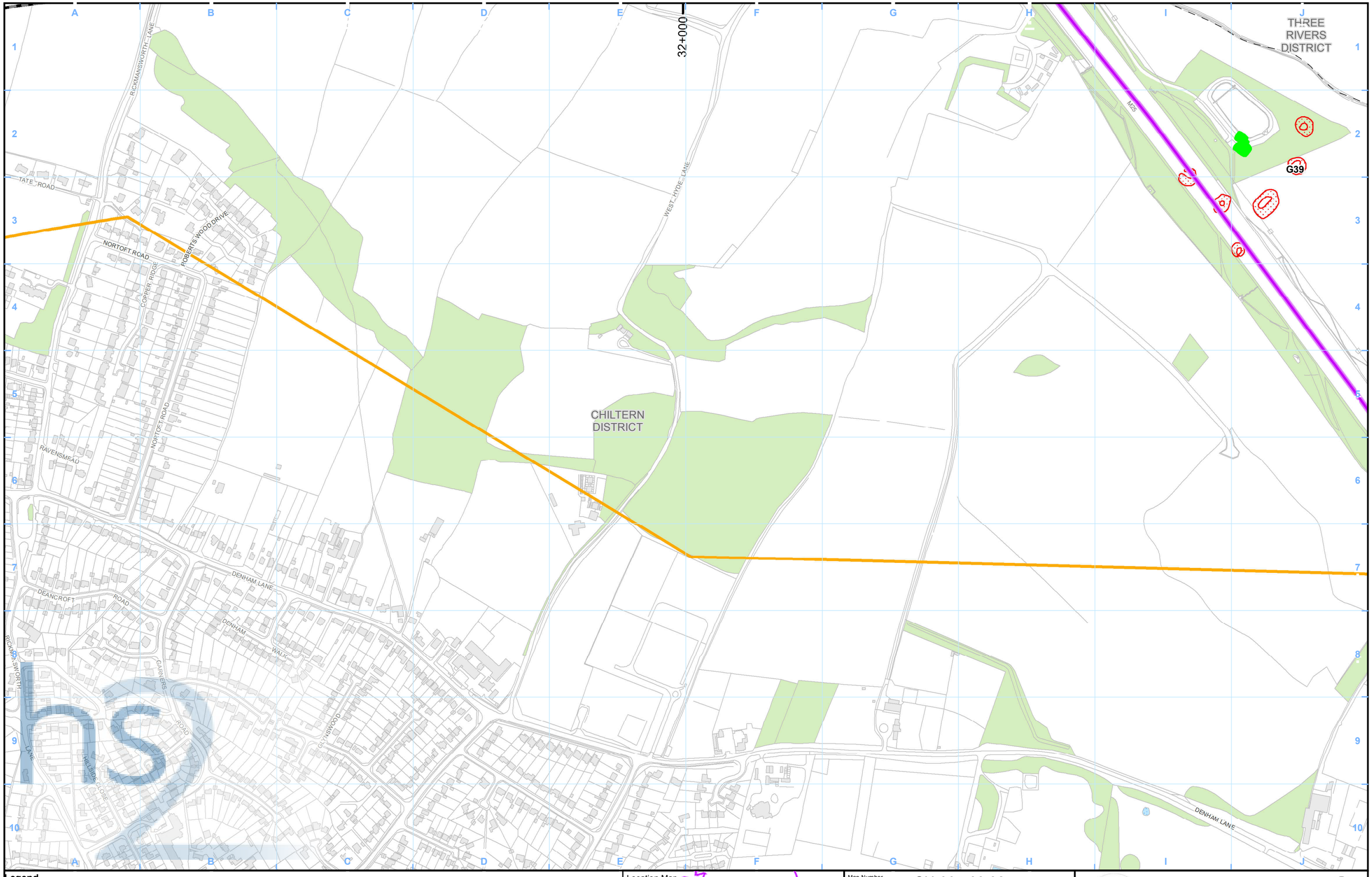
Date: 06/09/13



Legend

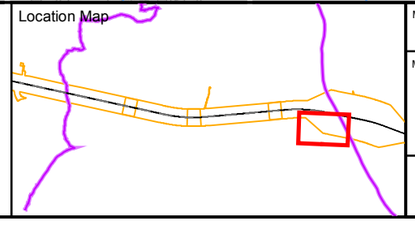
- Route in tunnel
- Route on surface
- Community forum boundary
- District/Borough boundary
- Watercourse
- Water body
- Woodland
- Remote sensing survey boundary

Archaeological features

- Bank
- Ditch
- Extant ridge and furrow direction
- Levelled ridge and furrow direction
- Structure
- T-Hachure

- Extent of Area
- Bank
- Ditch
- Extant ridge and furrow outline
- Levelled ridge and furrow outline
- Structure
- Large cut feature

Location Map



Map Number: CH-004-08.02

Map Name: Remote Sensing Survey Interpretation

Community Forum Area CFA8: The Chalfonts & Amersham

Scale at A3: 1:5,000

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Doc Number: C252-ETM-EV-MAP-020-002622-P03.00

Date: 06/09/13

GORELANDS LANE
Model Farm
Rowan Farm
Little Newlands
Gorelands
CHESHAM LANE
BRAWLINGS LANE
Brawlings Farmhouse
Ashwell's Farm
CHILTERN DISTRICT
Tubbs Cottages
VALENTINE WAY
Chalfont St Giles
Skipping Farm
THE BROW
H03
H02
H04
34+000
33+000
H01
RICKMANSWORTH LANE
Chalfont Common
Turner's Wood Farm
H05
CHESHAM LANE
TATE ROAD
MICHOLLS AVENUE
Queen Elizabeth Medical Centre
NORTOFT ROAD
ROBERTS WOOD DRIVE
GABLES CLOSE
FODDELL WAY
PENN GASKELL LANE
Chalfont St Peter
PHEASANT WALK
A413

Legend

- Route in tunnel
- Route on surface
- Community forum boundary
- District/Borough boundary
- Watercourse
- Water body
- Woodland
- Remote sensing survey boundary

Archaeological features
- Bank
- Ditch
- Extant ridge and furrow direction
- Levelled ridge and furrow direction
- Structure
- T-Hachure

- Extent of Area
- Bank
- Ditch
- Extant ridge and furrow outline
- Levelled ridge and furrow outline
- Structure
- Large cut feature

Location Map

Map Number: CH-004-08.03

Map Name: Remote Sensing Survey Interpretation

Community Forum Area CFA8: The Chalfonts & Amersham

Scale at A3: 1:5,000

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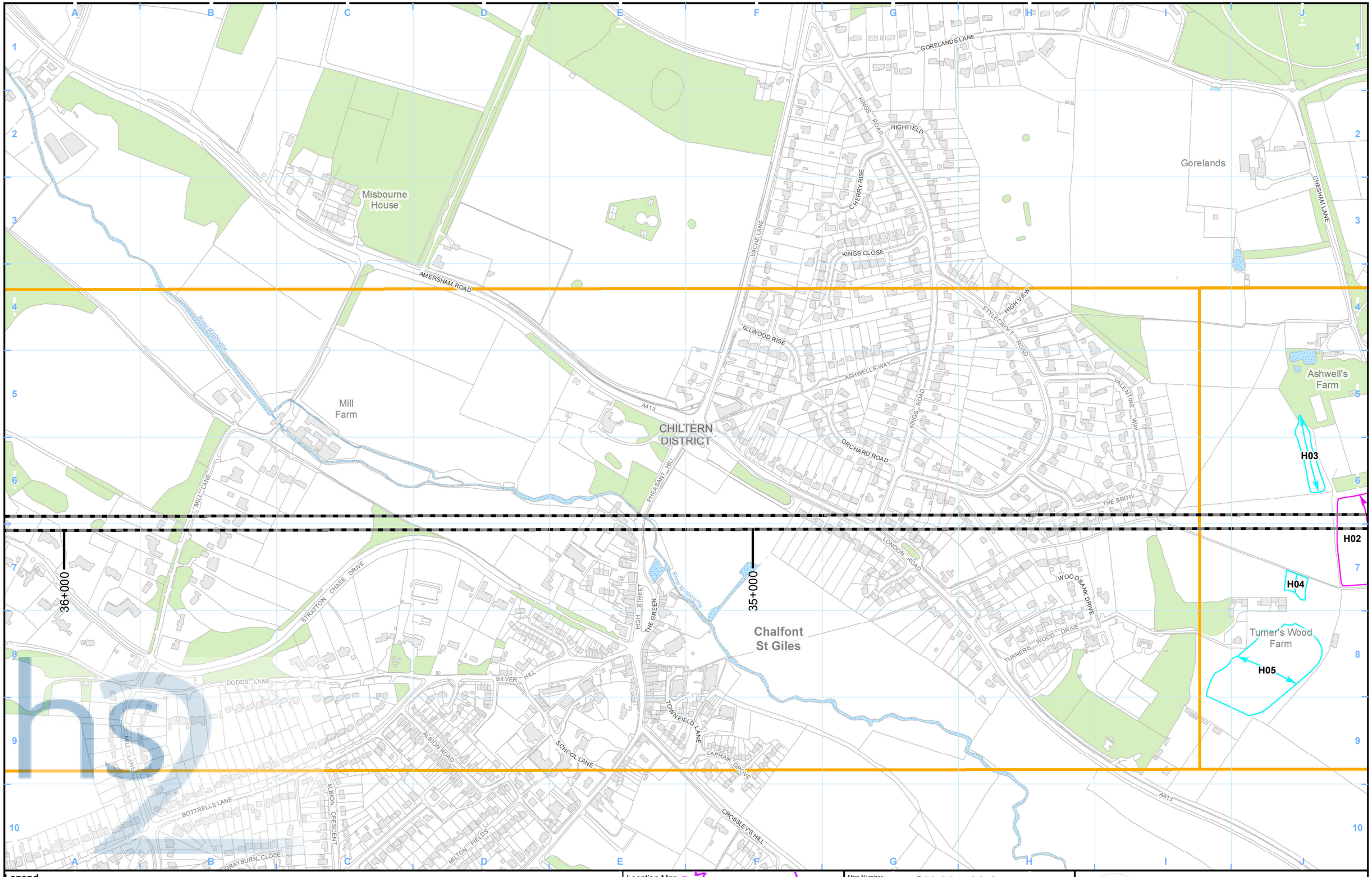
Date: 06/09/13



Legend

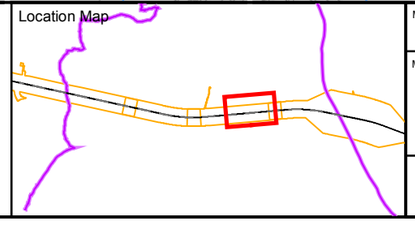
- Route in tunnel
- Route on surface
- Community forum boundary
- District/Borough boundary
- Watercourse
- Water body
- Woodland
- Remote sensing survey boundary

Archaeological features

- Bank
- Ditch
- Extant ridge and furrow direction
- Levelled ridge and furrow direction
- Structure
- T-Hachure

- Extent of Area
- Bank
- Ditch
- Extant ridge and furrow outline
- Levelled ridge and furrow outline
- Structure
- Large cut feature

Location Map



Map Number: CH-004-08.04

Map Name: Remote Sensing Survey Interpretation

Community Forum Area CFA8: The Chalfonts & Amersham

Scale at A3: 1:5,000

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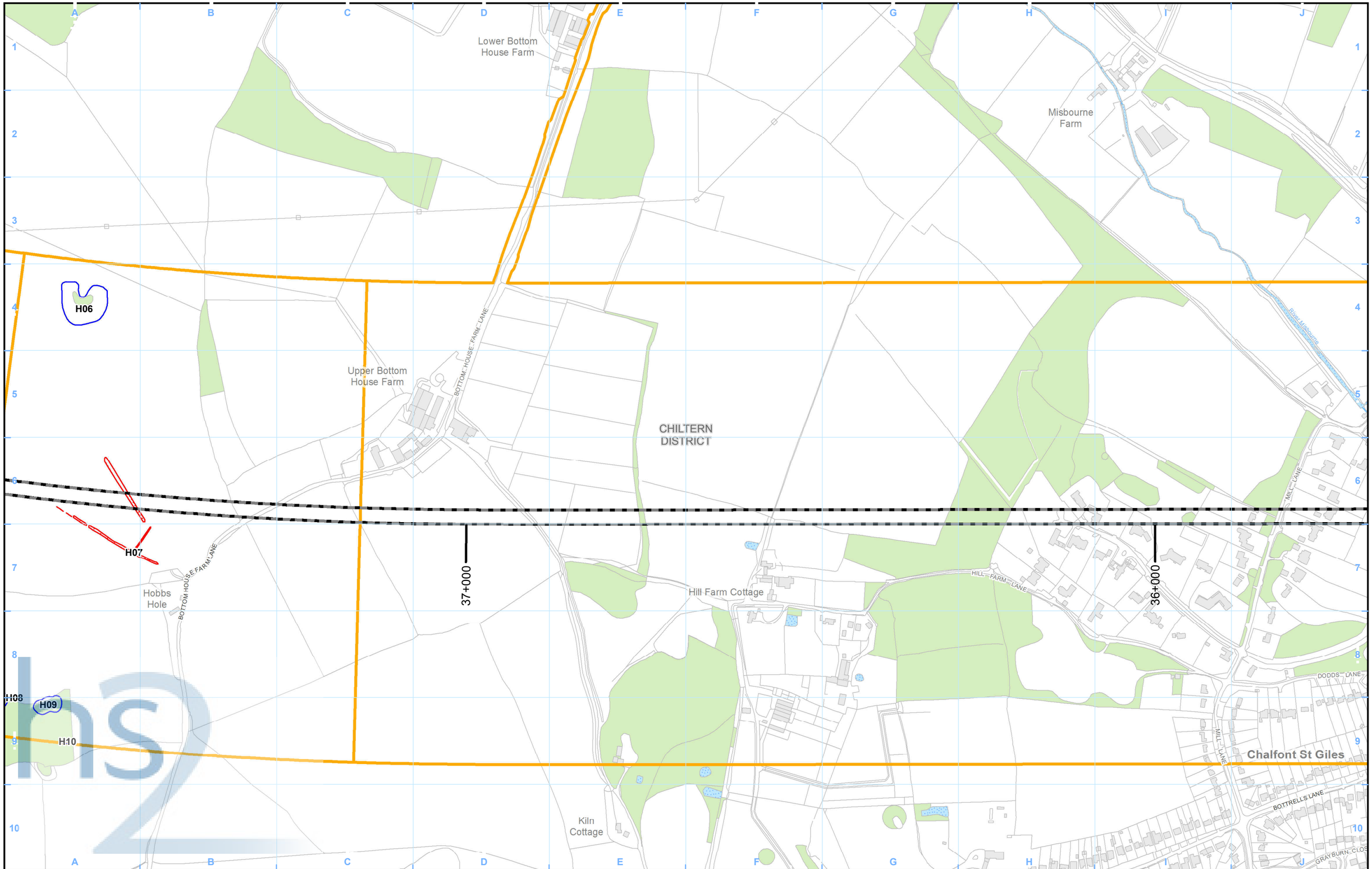
Doc Number: C252-ETM-EV-MAP-020-002560-P03.00

Date: 06/09/13



Legend

- Route in tunnel
- Route on surface
- Community forum boundary
- District/Borough boundary
- Watercourse
- Water body
- Woodland
- Remote sensing survey boundary

Archaeological features
- Bank
- Ditch
- Extant ridge and furrow direction
- Levelled ridge and furrow direction
- Structure
- T-Hachure

- Extent of Area
- Bank
- Ditch
- Extant ridge and furrow outline
- Levelled ridge and furrow outline
- Structure
- Large cut feature

Location Map

Map Number: CH-004-08.05

Map Name: Remote Sensing Survey Interpretation

Community Forum Area CFA8: The Chalfonts & Amersham

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Scale at A3: 1:5,000

0 50 100 150 200 Metres

Doc Number: C252-ETM-EV-MAP-020-002561-P03.00

Date: 06/09/13

Rodger's Wood
Quarrendon Farm
Keeper's Cottage
CHILTERN DISTRICT
H06
39+000
38+000
AMERSHAM ROAD
A355
H07
BOTTOM HOUSE FARM LANE
Hobbs Hole
TOWER ROAD
Brentford Wood
The Gorse
H08
H09
H10
Rushymead

Legend

- Route in tunnel
- Route on surface
- Community forum boundary
- District/Borough boundary
- Watercourse
- Water body
- Woodland
- Remote sensing survey boundary

Archaeological features
- Bank
- Ditch
- Extant ridge and furrow direction
- Levelled ridge and furrow direction
- Structure
- T-Hachure

- Extent of Area
- Bank
- Ditch
- Extant ridge and furrow outline
- Levelled ridge and furrow outline
- Structure
- Large cut feature

Location Map

Map Number: CH-004-08.06

Map Name: Remote Sensing Survey Interpretation

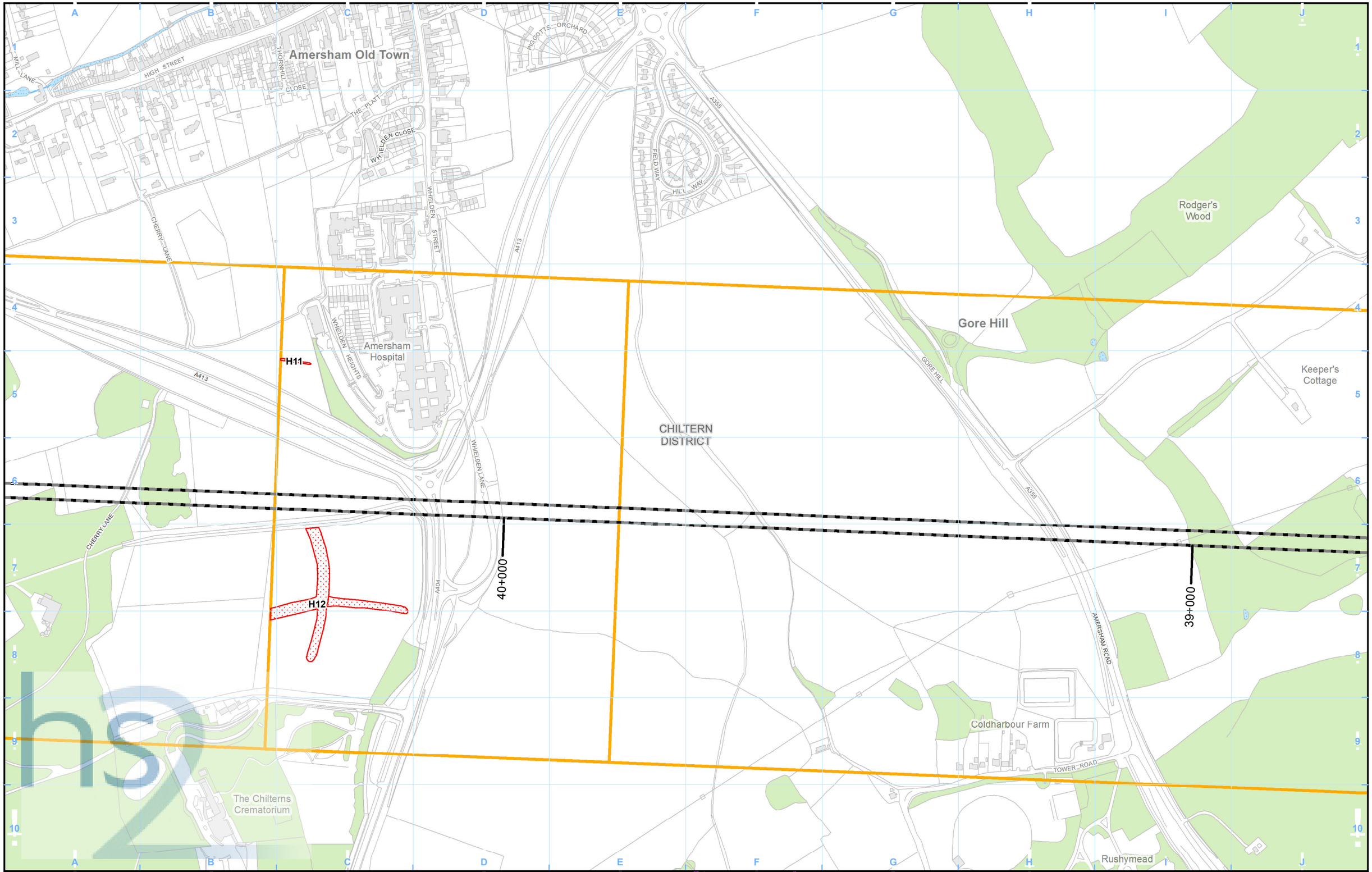
Community Forum Area CFA8: The Chalfonts & Amersham

Scale at A3: 1:5,000

0 50 100 150 200 Metres

Doc Number: C252-ETM-EV-MAP-020-002562-P03.00

Date: 06/09/13



Legend

- Route in tunnel
- Route on surface
- Community forum boundary
- District/Borough boundary
- Watercourse
- Water body
- Woodland
- Remote sensing survey boundary

Archaeological features

- Bank
- Ditch
- Extant ridge and furrow direction
- Levelled ridge and furrow direction
- Structure
- T-Hachure

- Extent of Area
- Bank
- Ditch
- Extant ridge and furrow outline
- Levelled ridge and furrow outline
- Structure
- Large cut feature

Location Map

Map Number: CH-004-08.07

Map Name: Remote Sensing Survey Interpretation

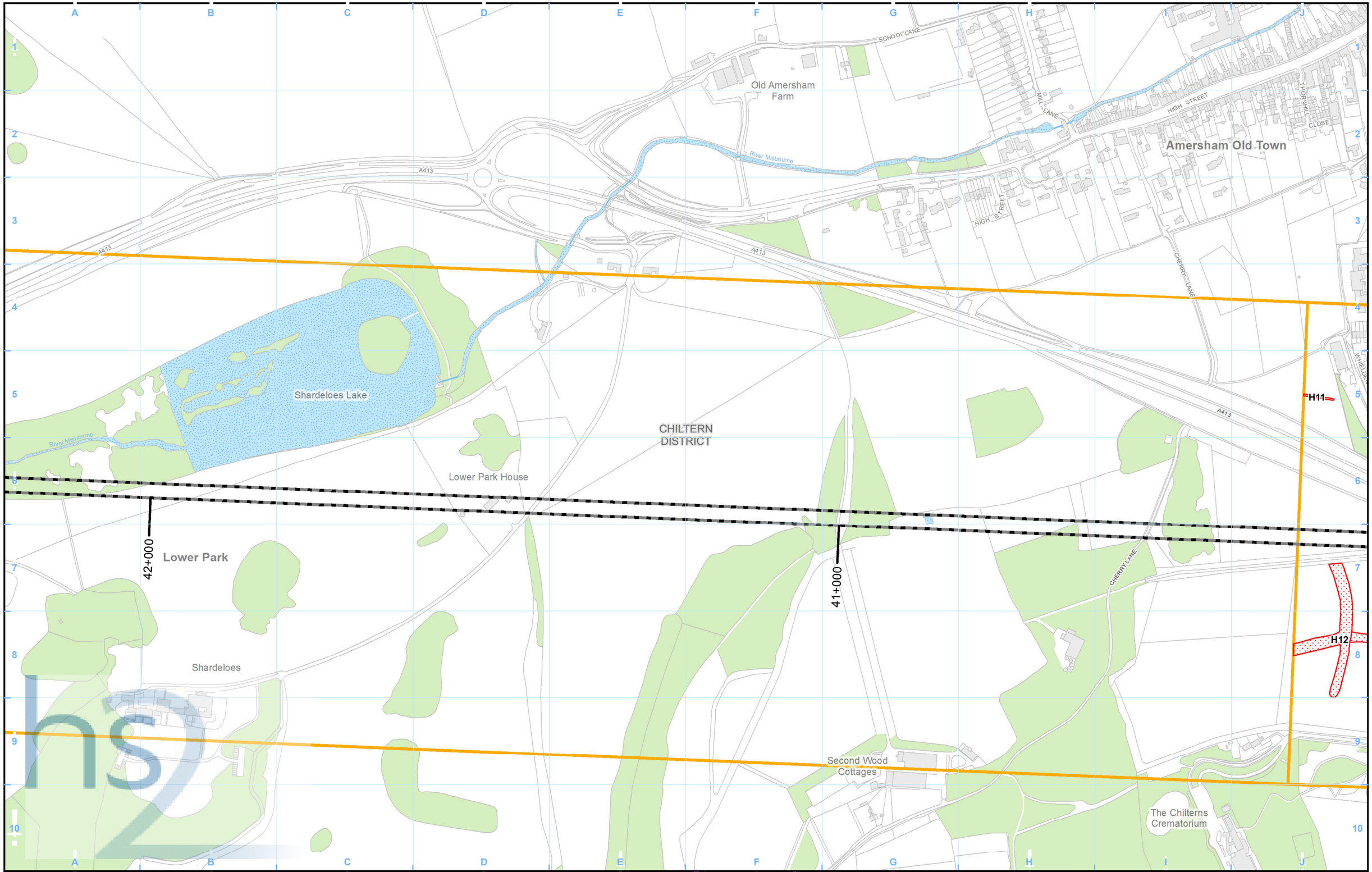
Community Forum Area CFA8: The Chalfonts & Amersham

Scale at A3: 1:5,000

0 50 100 150 200 Metres

Doc Number: C252-ETM-EV-MAP-020-002563-P03.00

Date: 06/09/13



Legend

- Route in tunnel
- Route on surface
- Community forum boundary
- District/Borough boundary
- Watercourse
- Water body
- Woodland
- Remote sensing survey boundary

Archaeological features
- Bank
- Ditch
- Extant ridge and furrow direction
- Levelled ridge and furrow direction
- Structure
- T-Hachure

- Extent of Area
- Bank
- Ditch
- Extant ridge and furrow outline
- Levelled ridge and furrow outline
- Structure
- Large cut feature

Location Map

Map Number: CH-004-08.08

Map Name: Remote Sensing Survey Interpretation

Community Forum Area CFA8: The Chalfonts & Amersham

Scale at A3: 1:5,000

0 50 100 150 200 Metres

Doc Number: C252-ETM-EV-MAP-020-002564-P03.00

Date: 06/09/13

THE CHALFONTS AND AMERSHAM

CENTRAL CHILTERNS

Jays Hatch
Lott's Wood
Keeper's Wood
KEEPERS LANE
Ash Grove Picnic Site
Lime Farm
Kennel Farm
Little Missenden
HIGHMORE COTTAGES
River Misbourne
CHILTERN DISTRICT
A413
43+000
42+000
Shardeloes Lake
River Misbourne
Lower Park
Shardeloes

I01 I02 I03 I04 I05 I06 I07 I08 I09 I10 I12 I14 I64

Legend

- Route in tunnel
- Route on surface
- Community forum boundary
- District/Borough boundary
- Watercourse
- Water body
- Woodland
- Remote sensing survey boundary

Archaeological features
- Bank
- Ditch
- Extant ridge and furrow direction
- Levelled ridge and furrow direction
- Structure
- T-Hachure

- Extent of Area
- Bank
- Ditch
- Extant ridge and furrow outline
- Levelled ridge and furrow outline
- Structure
- Large cut feature

Location Map

Map Number: CH-004-08.09

Map Name: Remote Sensing Survey Interpretation

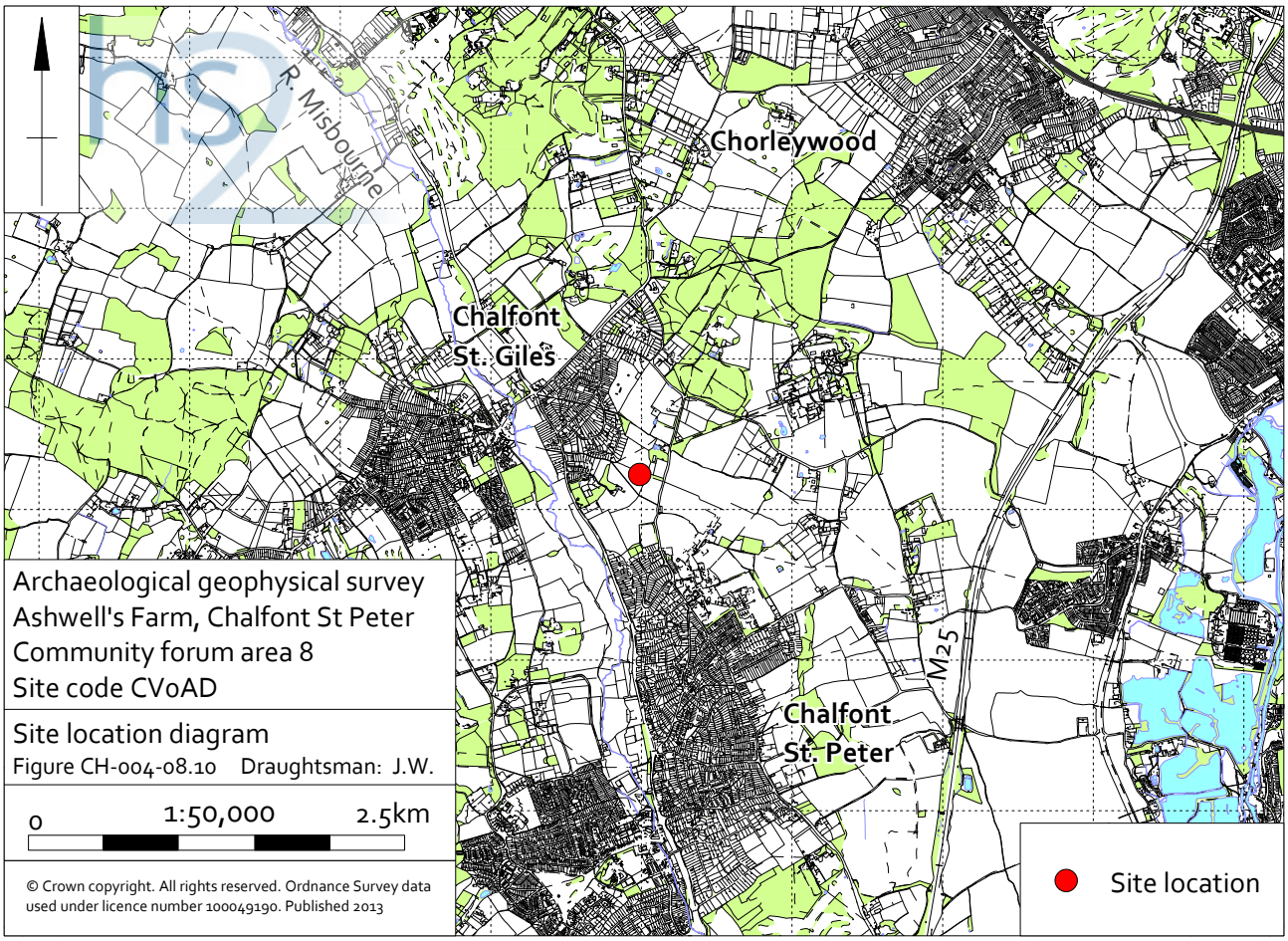
Community Forum Area CFA8: The Chalfonts & Amersham

Scale at A3: 1:5,000

0 50 100 150 200 Metres

Doc Number: C252-ETM-EV-MAP-020-002565-P03.00

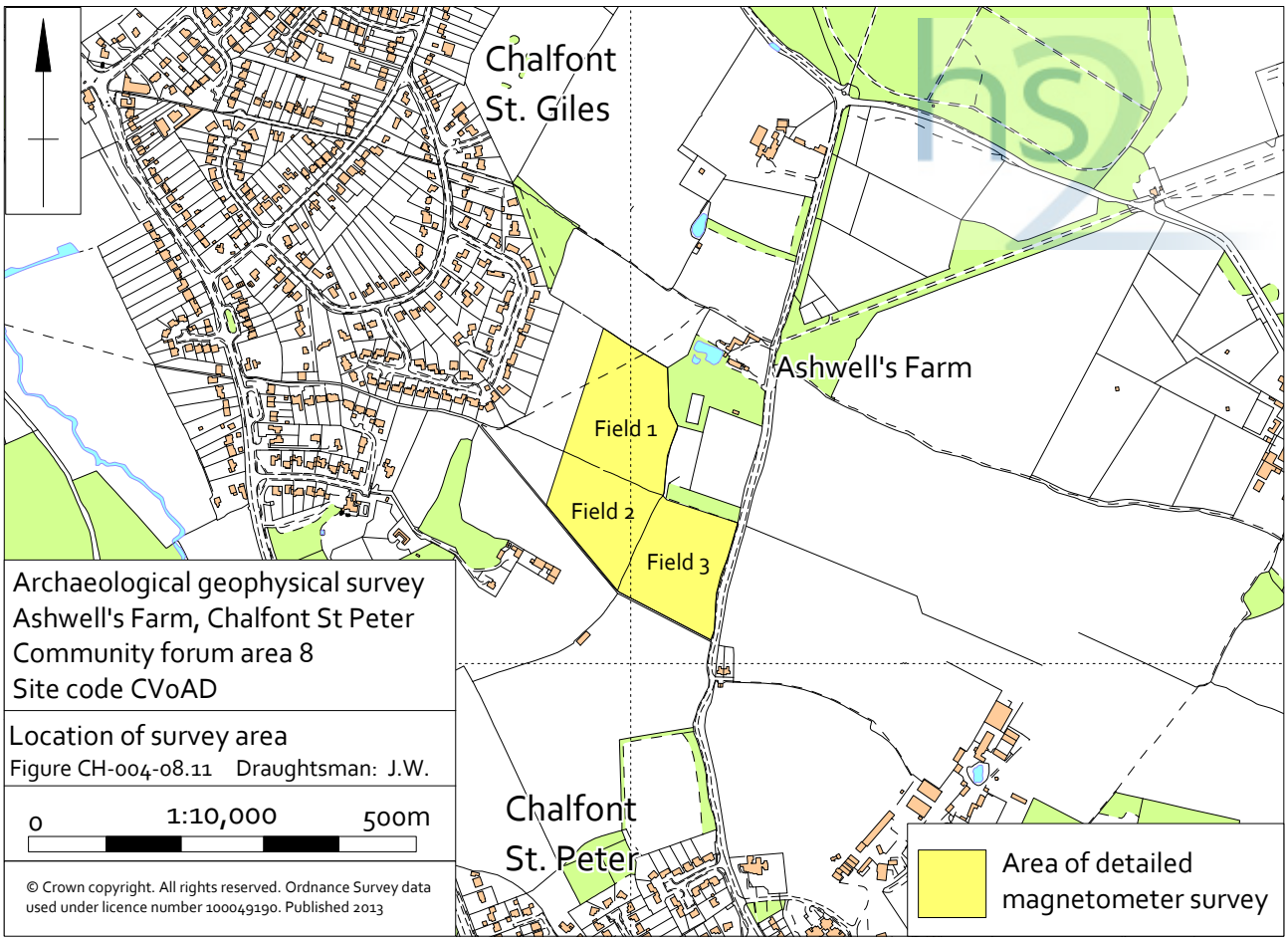
Date: 06/09/13



Archaeological geophysical survey
Ashwell's Farm, Chalfont St Peter
Community forum area 8
Site code CVoAD

Site location diagram
Figure CH-004-08.10 Draughtsman: J.W.

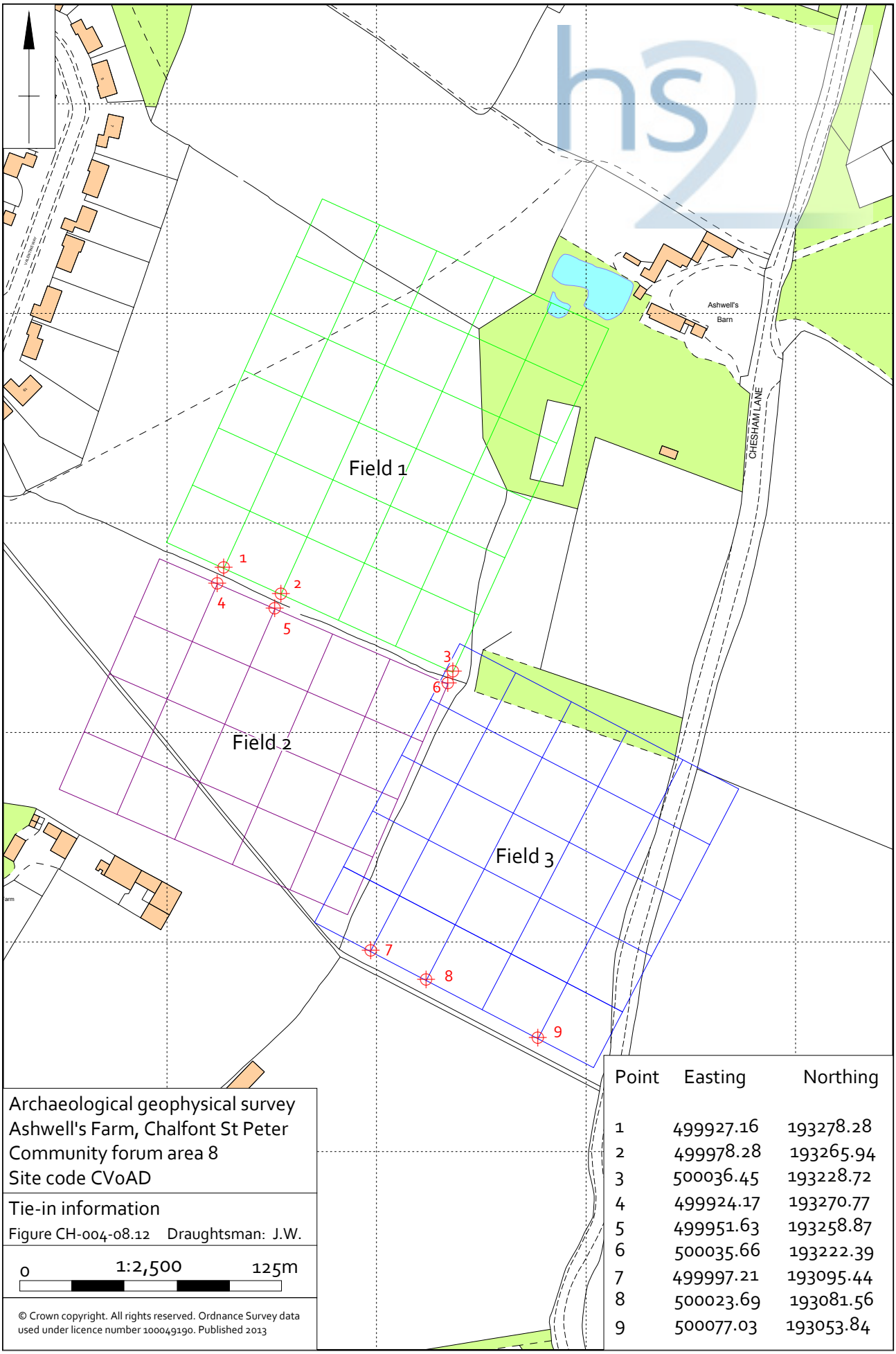
0 1:50,000 2.5km



Archaeological geophysical survey
Ashwell's Farm, Chalfont St Peter
Community forum area 8
Site code CVoAD

Location of survey area
Figure CH-004-08.11 Draughtsman: J.W.

0 1:10,000 500m



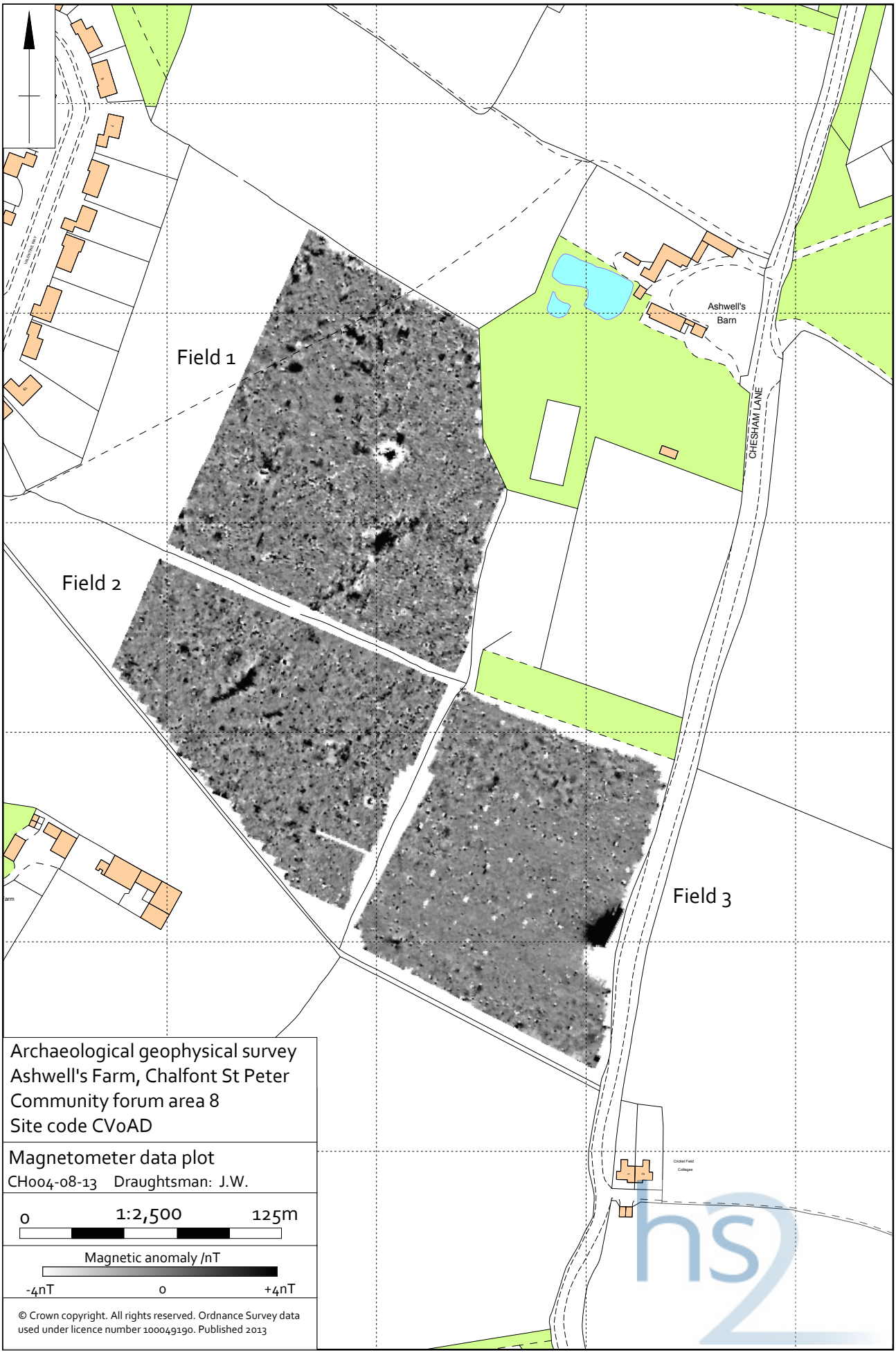
Archaeological geophysical survey
Ashwell's Farm, Chalfont St Peter
Community forum area 8
Site code CVoAD

Tie-in information

Figure CH-004-08.12 Draughtsman: J.W.

0 1:2,500 125m

Point	Easting	Northing
1	499927.16	193278.28
2	499978.28	193265.94
3	500036.45	193228.72
4	499924.17	193270.77
5	499951.63	193258.87
6	500035.66	193222.39
7	499997.21	193095.44
8	500023.69	193081.56
9	500077.03	193053.84

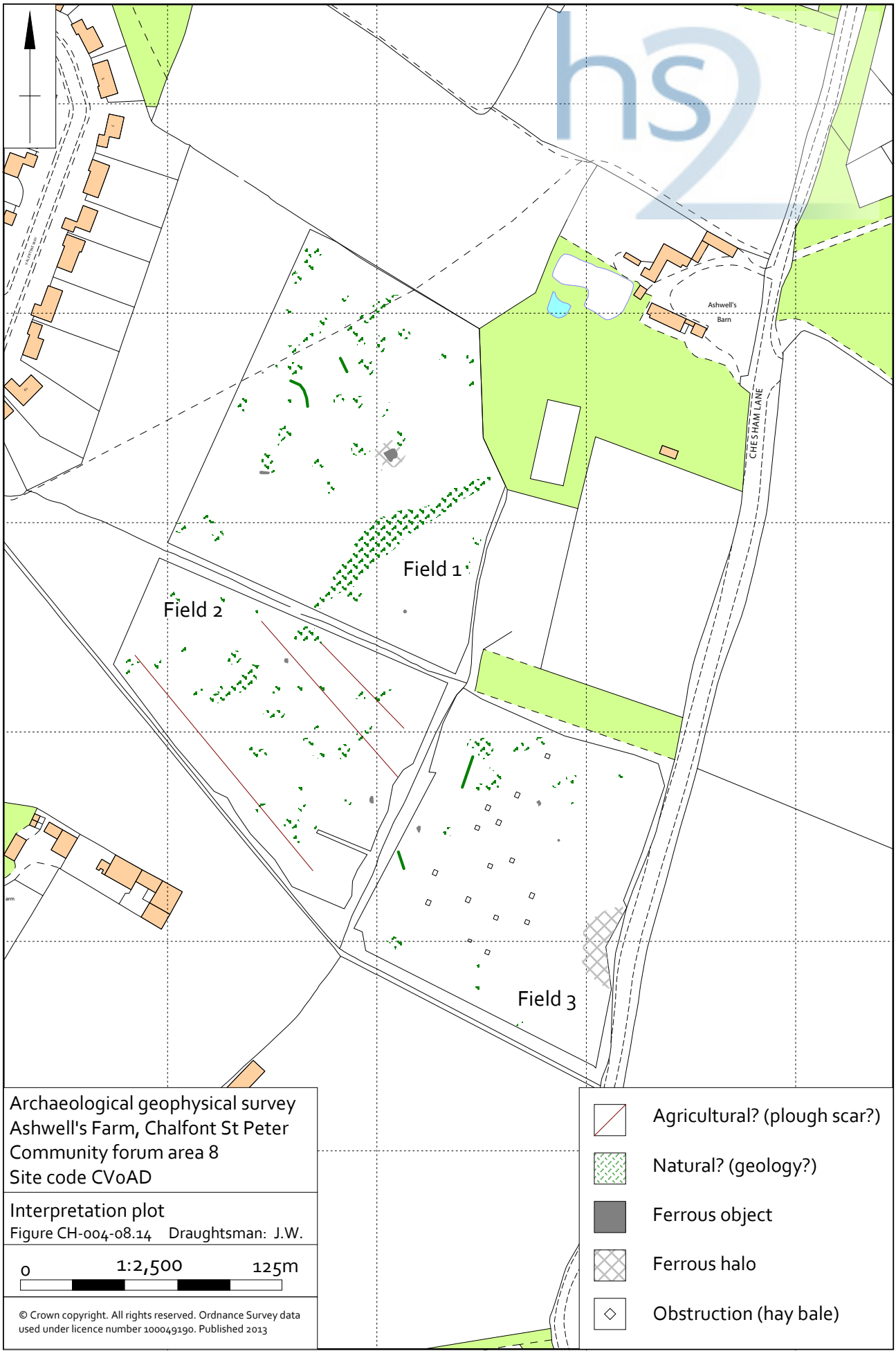


Archaeological geophysical survey
Ashwell's Farm, Chalfont St Peter
Community forum area 8
Site code CVoAD

Magnetometer data plot
CH004-08-13 Draughtsman: J.W.

0 1:2,500 125m

Magnetic anomaly /nT
-4nT 0 +4nT



Archaeological geophysical survey
Ashwell's Farm, Chalfont St Peter
Community forum area 8
Site code CVoAD

Interpretation plot
Figure CH-004-08.14 Draughtsman: J.W.

0 1:2,500 125m

- Agricultural? (plough scar?)
- Natural? (geology?)
- Ferrous object
- Ferrous halo
- Obstruction (hay bale)